

Q.630.7

l46c

no.899

1980

cop.5

UNIVERSITY OF
ILLINOIS LIBRARY
AT URBANA-CHAMPAIGN
AGRICULTURE



Digitized by the Internet Archive
in 2011 with funding from
University of Illinois Urbana-Champaign



1980 Insect Pest Management Guide

FIELD and FORAGE CROPS

You must be certified as a pesticide applicator to use restricted-use pesticides.
See your county Extension adviser in agriculture for information.

FEDERAL AND STATE LAWS

The U.S. Environmental Protection Agency is classifying pesticides for "general" or "restricted" use. Anyone applying a restricted-use pesticide must be certified. Only a few pesticides have been classified.

Commercial applicators who apply restricted-use pesticides must be certified. Commercial applicators include not only persons applying a pesticide for hire but also governmental personnel, chemical company representatives, and others involved in demonstrational, regulatory, and public health pest control. Certification as a commercial applicator requires passing a written examination administered either by the Illinois Department of Agriculture or the Department of Public Health.

Private applicators who use restricted-use pesticides "for the purpose of producing any agricultural commodity on property owned or rented by him or as exchange labor (no compensation) on the property of another" must also be certified, either by attending an educational training program or by passing an examination.

Educational training programs for farmers (private applicators) and commercial pesticide applicators are conducted by the Cooperative Extension Service to prepare persons for certification. For additional information, consult your county Extension adviser in agriculture. The actual certification and the issuing of permits or licenses are handled by the Illinois Department of Agriculture or the Illinois Department of Public Health.

Special Local Need Registrations

Section 24(c) of the amendments to the Federal Insecticide, Fungicide, and Rodenticide Act of 1972 allows states the right to register pesticides for use within the state to meet special local needs (SLN). The authority for state registration of pesticides is the Illinois Department of Agriculture. A special label, which lists the new

Asterisks (*) are used throughout this circular to indicate insecticides classified for "restricted" use by the U.S. Environmental Protection Agency.

Consider all grain fumigants as restricted-use insecticides.

24(c) uses, is printed by the formulator. A copy of this label must be in the possession of the operator during application of the pesticides.

In the following pages, all SLN, or 24(c), registrations are indicated by this sign: †.

Insecticides and Classifications

At the time this publication was in preparation, only a few of the insecticides listed below had been classified for either "restricted" or "general" use by the EPA. Additional insecticides are expected to be classified before the 1980 planting season. Your county Extension adviser will have additional information on insecticide restrictions.

The chemical names used in this circular may be unfamiliar to you. These names are the common, coined chemical names and as such are not capitalized (for example, terbufos). Trade names are capitalized (for example, Counter). In the table of limitations (Table 10), the trade names are listed first, with the common name in parentheses following the trade name. In the tables of suggestions, the common name is listed first and the trade name is in parentheses. For questions, refer to the list shown below or to Table 10.

Table 1. INSECTICIDE CLASSIFICATIONS

Common name	Trade name	Classification
azinphosmethyl.....	*Guthion	restricted
carbaryl.....	Sevin, Savit	unclassified
carbofuran.....	*Furadan	restricted ^b
carbophenothion.....	Trithion	unclassified
chlorpyrifos.....	Lorsban	unclassified
diazinon.....	diazinon	unclassified
dimethoate.....	Cygon, Defend	unclassified
ethoprop.....	*Mocap	restricted ^b
fonofos.....	*Dyfonate	restricted ^b
malathion.....	Cythion, malathion	unclassified
methidathion.....	Supracide	unclassified
methomyl.....	*Lannate	restricted ^a
methyl parathion.....	*methyl parathion	restricted
methyl parathion.....	*Penncap-M	restricted
(microencapsulated)		
phorate.....	Thimet	unclassified
phosmet.....	Imidan	unclassified
terbufos.....	Counter	unclassified
toxaphene.....	toxaphene	unclassified
trichlorfon.....	Dylox, Proxol	unclassified

^a All formulations except water-soluble packages are restricted.

^b Liquid formulations are restricted.

GENERAL SUGGESTIONS FOR INSECT CONTROL

The type of crop rotation influences to a great extent whether or not a soil-insect problem will occur and what kind it will be. Some guidelines follow for predicting soil-insect problems in corn and for determining the need to use a soil insecticide at planting time. Exceptions can be expected occasionally because soil-insect problems are influenced by a variety of things unrelated to crop rotation, such as the weather, soil type, planting date, hybrid used, tillage, and natural enemies. Knowledge about soil-insect damage in a particular field during previous years is also helpful because infestations tend to occur in the same fields and in the same area.

The potential for soil-insect problems in **corn after soybeans** is generally low, and the use of soil insecticides rarely pays. In most fields, a diazinon planter-box seed treatment will be adequate to protect against attack by seed-corn beetles and seed-corn maggots. *Corn rootworms* rarely cause damage to corn after soybeans. An exception may occur when corn rootworm beetles are attracted to, and deposit their eggs in, soybean fields that are weedy or that contain volunteer corn. When such fields are planted to corn the following year, economic damage may occur. Good weed control will reduce the attractiveness of soybean fields to rootworm beetles and permit soybean-corn rotations with noneconomic damage from corn rootworms.

White grubs are an occasional problem in east-central Illinois in corn after soybeans.

The potential for rootworm damage in **corn after corn** is moderate to severe in the northern two-thirds of Illinois, and a rootworm insecticide may be needed. Wireworms are occasionally a problem in the southern portions of Illinois.

Wireworms and white grubs are potential problems, in **corn after grass sod**. Apply a soil insecticide at planting time.

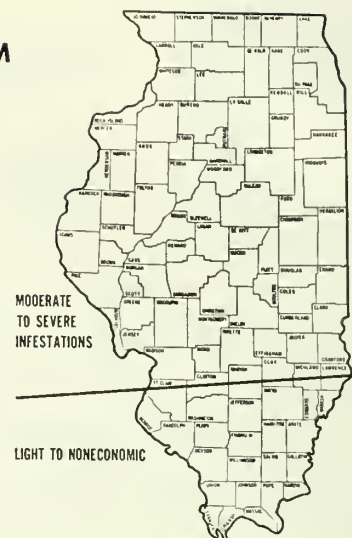
Grape colaspis, grubs, wireworms, and cutworms are potential problems in **corn after clover and alfalfa**. In northern Illinois, rootworms are occasionally a problem in corn following clover or alfalfa. Apply a soil insecticide at planting time.

There is a slight potential for damage by wireworms, seed-corn beetles, and seed-corn maggots in **corn after small grain**. In most instances, a diazinon planter-box seed treatment will be adequate. If wireworms are present, use a soil insecticide at planting time.

CORN ROOTWORM SITUATION, 1980

Moderate to severe damage by western and northern corn rootworm larvae can be expected in many fields of corn that follow corn in the northern two-thirds of Illinois in 1980 (see map). The potential for damage south of a line from Belleville to Lawrenceville is low, although an occasional field may sustain economic damage. These predictions are based on a survey of rootworm beetle populations taken in August, 1979.

CORN ROOTWORM POTENTIAL, 1980



The populations of western and northern corn rootworm beetles were slightly higher in most counties during 1979 than they were in 1978. Beetle numbers were still lower, however, than those observed in 1976-77. The western corn rootworm continued its southward movement and has now been found in every county in Illinois except Pulaski and Alexander.

Corn growers should base the need for using a soil insecticide in 1980 on the abundance of rootworm beetles in cornfields in August, 1979. If the rootworm beetles averaged one or more per plant at any time during late July or August, 1979, plan to use a rootworm soil insecticide if the field is to be replanted to corn in 1980.

Fields of corn planted in late May or June, 1979, may have extensive rootworm damage if replanted to corn in 1980. Rootworm beetles seeking pollen and silks to feed on during August, 1979, very likely were attracted in large numbers to late-planted cornfields. Millions of eggs may have been laid in these late-planted fields of corn. Planting those fields to a crop other than corn in 1980 will help reduce the overall rootworm populations.

During 1979, moderate to heavy rootworm damage was reported in some fields treated at planting time with soil insecticides. Several factors may be responsible for poor or marginal control. Lack of moisture for several weeks following planting may be a factor. Rainfall is necessary to move the insecticide down to the zone where rootworm eggs are hatching and larvae are feeding. In addition, the insecticide rates were too low in some fields. The rate per acre depends on the row spacing (see Table 2 for suggested rates).

Rootworm resistance to the organic phosphate and carbamate insecticides also may be developing in some fields. Laboratory tests indicate that to kill rootworm beetles slightly higher rates of insecticide were needed in 1979 than in 1972. Although these data on rootworm resistance are not conclusive, they are a warning sign for the future. **Whenever insecticides, regardless of type, are used continually and extensively over a large area, insect resistance to those insecticides is likely to occur.**

SUGGESTIONS FOR ROOTWORM CONTROL, 1980

Crop Rotation

This method is the most effective way to prevent damage by corn rootworm larvae. If feasible, do not grow corn 2 years in succession in the same field. Corn rootworm beetles deposit the vast majority of their eggs in fields of corn. Consequently, when a crop other than corn is planted in a field with soil containing millions of rootworm eggs, millions of larvae will perish and will not emerge as egg-laying beetles. The larvae hatching from rootworm eggs cannot survive on the roots of broadleaf weeds or broadleaf crops (soybeans or alfalfa). In a few rare instances, rootworm damage has occurred when corn was planted after soybeans where there was an extensive infestation of volunteer corn or weeds in the soybeans during August. Rootworm beetles were attracted to these weedy fields of soybeans to deposit eggs. Corn following alfalfa may benefit from an insecticide treatment because rootworm beetles occasionally deposit their eggs in alfalfa fields during the bloom stage in August.

Soil Insecticides

Planting-Time Treatments. Apply terbufos (Counter), fonofos (Dyfonate), carbofuran (Furadan), chlorpyrifos (Lorsban), ethoprop (Mocap), or phorate (Thimet) in a 7-inch band ahead of the press wheel at the recommended rate (see Table 2). These soil insecticides will give 50- to 70-percent control of corn rootworm larvae, which is adequate to prevent economic larval damage in most fields. In some heavily infested fields, enough larvae may survive to cause economic root damage. Planting-time treatments applied in early April may give marginal control. Consider a late-May cultivator application in such fields, rather than a planting-time treatment.

During 1977-79, rootworm control research was conducted at 25 sites in Illinois. Terbufos (Counter) gave effective control in 24 of 25 tests; carbofuran (Furadan), in 22 of 25; fonofos (Dyfonate), in 22 of 25; phorate (Thimet), in 22 of 25; ethoprop (Mocap), in 20 of 25; and chlorpyrifos (Lorsban), in 18 of 25 tests. Control in these tests was considered marginal for a treatment if

enough roots were damaged by larvae to cause yield losses. **CAUTION:** These tests do not necessarily indicate that similar results would occur in 1980.

NOTE: If a soil insecticide gave good results in 1979, it will probably provide adequate control in 1980. Exceptions have occurred when a particular insecticide has been used for several consecutive years in the same field. If an insecticide gave poor control last year, switch to another one in 1980.

Research conducted during 1976-78 indicates that switching from a carbamate (carbofuran) to an organic phosphate (terbufos, fonofos, chlorpyrifos, ethoprop, or phorate) may be desirable, particularly if carbofuran has been used for several consecutive years. In fields where carbofuran has provided poor rootworm control, it is advisable to wait longer than a year before using carbofuran again. If control with an organic phosphate was poor last year, switch to a carbamate (carbofuran).

A word of caution about rotating classes of soil insecticides: The performance of an insecticide that gives only fair control of rootworms will not be improved by alternating it with other insecticides. But the performance of an insecticide rated fair might be improved under favorable weather conditions or with light infestations.

Liquid formulations of carbofuran (Furadan 4F) or fonofos (Dyfonate 4E) may be mixed with water and applied as a spray in a 7-inch band ahead of the press wheel or mixed with liquid fertilizer and used with a split-boot applicator at planting time. Ethoprop (Mocap 6E) is labeled as a band spray mixed with water. Some farmers have had problems with *compatibility* or *crop injury* when using liquid insecticide-fertilizer treatments at planting time. The liquid insecticide **MUST** be compatible with the liquid fertilizer. Conduct a test to make certain the mixture is physically compatible before planting. Maintain agitation in the tank after mixing and during application. **Use caution when handling liquid formulations. They are more toxic than granular formulations.**

Cultivator Treatments. Apply granular terbufos (Counter), fonofos (Dyfonate), carbofuran (Furadan), ethoprop (Mocap), or phorate (Thimet), in a band at the base of the plants just ahead of the cultivator shovels.

Table 2. SOIL INSECTICIDES SUGGESTED FOR CORN ROOTWORM CONTROL AT PLANTING TIME, 1980

Insecticide	Class	Relative effectiveness ^a	Ounces of product per 1,000 ft. of row	Pounds of product needed per acre			
				40" rows	38" rows	36" rows	30" rows
Counter 15G	organic phosphate	good	8	6.7	7.0	7.4	8.7
Furadan 10G	carbamate	fair-good ^b	12	10.0	10.5	11.1	13.3
Dyfonate 20G	organic phosphate	fair-good	6	5.0	5.3	5.6	6.7
Thimet 15G	organic phosphate	fair-good	8	6.7	7.0	7.4	8.7
Mocap 10G	organic phosphate	fair	12	10.0	10.5	11.1	13.3
Lorsban 15G	organic phosphate	fair	8	6.7	7.0	7.4	8.7

^a This chart gives a general comparative rating based on Illinois research data using root ratings as a criterion during 1977-79. Under unfavorable conditions some insecticides rated good or fair may give erratic or poor results. Under favorable conditions, control may be better than indicated.

^b Rootworm control in research trials with Furadan has generally been good, except in some fields with a history of continuous Furadan use.

Cover the granules with soil. The best time to apply a basal treatment of a soil insecticide by cultivator is in late May or early June, near the beginning of egg-hatch. Such a treatment may be more effective than planting-time treatments in early April.

Control of Rootworm Beetles

Use insecticides to control rootworm beetles where pollination damage may occur because of silk clipping. Research on spraying the beetles to prevent egg laying and thus eliminate the need for a soil insecticide the next spring has produced variable results. A single soil-insecticide treatment has usually been as effective as treating to control beetles in late July or early August and applying a soil treatment the following spring. Some growers may choose to experiment with the management concept of spraying rootworm beetles with carbaryl (Sevin 4-Oil) to prevent egg laying, with the objective of eliminating next year's larval infestation and the need for a soil insecticide. If so, we encourage growers to use the scouting services of a pest management consultant to monitor fields. A properly managed adult-suppression program will require weekly scouting during July and August. Even proper timing and application of an adult-suppression spray does not guarantee success. Factors beyond the control of the operator, such as weather and beetle migration, may minimize the treatment's effectiveness.

SCOUTING TO DETERMINE ROOTWORM POTENTIAL

The abundance of rootworm beetles in a cornfield is an excellent indicator of future rootworm problems. Corn growers can determine the potential for rootworm damage in 1981 by counting western and northern corn rootworm beetles from mid-July through August, 1980, in this way:

1. Make 3 or more counts for western and northern corn rootworm beetles at 7- to 10-day intervals between mid-July and late August in fields to be replanted to corn.
2. Count the total number of western and northern corn rootworm beetles on 50 plants each time. Examine 10 plants selected at random in 5 areas of the field. About 45 minutes would be required to make the counts in a 40-acre field.
3. Move quietly as you approach a plant to avoid disturbing the beetles. Count the beetles on the entire plant, including the ear tip, the tassel, the leaf surface, and behind the leaf axils.
4. Record the number of beetles you find per plant. If the average is more than one beetle per plant for any sampling date, plan to apply a rootworm soil insecticide in 1981. If populations range from $\frac{1}{2}$ to 1 beetle per plant, the probability of economic damage the following year is low, and a soil insecticide will probably not be necessary. If populations do not exceed $\frac{1}{2}$ beetle per plant for any sampling date, a soil insecticide will not be needed the following season.

BLACK CUTWORMS

Cutworm infestations, although extremely damaging in some regions in 1979, were not as widespread as during 1978. The unpredictability of cutworm outbreaks makes it impossible to forecast what the situation might be in 1980. Cutworm damage that necessitates replanting or a "rescue" treatment occurs on an average of 300,000 acres of corn annually, or on about 3 percent of the corn acreage, based on reports from county Extension advisers over the past 25 years. Damage estimates have ranged from a low of 30,000 acres in 1957 to a high of 1.9-million acres in 1978. The amount of damage prevented by applying soil insecticides at or before planting has not been determined.

The factors that tend to favor cutworm outbreaks include late planting, infestations of broadleaf weeds prior to planting, reduced tillage, and corn following soybeans. The most important factors may be late planting and preplant weed infestations. Fields that are planted late are more likely to develop a preplant weed infestation, and late-planted fields with weeds are more attractive to cutworm moths as a site on which to deposit their eggs than fields tilled early in the spring. Fields with combinations of those factors are likely candidates for damage and should be monitored closely as the corn emerges.

Currently, three options are available for cutworm control: preplant or planting-time applications of soil insecticides to prevent damage and rescue treatments after the infestation appears. All have limitations.

Because of the uncertainty in predicting which fields will have light, moderate, or heavy infestations of cutworms, it may be more feasible to use rescue treatments for cutworm outbreaks rather than to use a preplant or planting-time treatment unnecessarily.

Based on the relatively low incidence of cutworm problems over the past 25 years, a grower may find an economic advantage to the wait-and-see system, which involves field scouting rather than a costly always-apply program in which the soil insecticide is routinely applied at or before planting for a problem that does not exist.

Rescue (or emergency) treatments to control outbreaks of cutworms include sprays of chlorpyrifos (Lorsban), carbaryl (Sevin), or trichlorfon (Dylox), or carbaryl pelletized bait. Broadcast the pelletized bait on the surface, but do not incorporate. Chlorpyrifos sprays should also be broadcast. Sprays of carbaryl may be banded over the row or broadcast, but the rates per acre need to be increased if the sprays are broadcast. Trichlorfon sprays should be banded.

The keys to effective cutworm control with the rescue treatments are the amount of surface moisture and the movement of the worms. Control may be poor, regardless of the insecticide used, if the topsoil is dry and crusted and the worms are working below the soil surface. Cutworm control under hot, dry soil conditions may be enhanced by cultivating or running a rotary hoe over the field

soon after spraying. This disruption may cause the worms to move around and come into contact with the insecticide.

To determine the need for rescue treatments, scout the fields during plant emergence, particularly those fields considered to be high-risk. **Early detection of leaf-feeding or of cutting by cutworms is vital.** When the corn plants are beginning to emerge, check the fields for leaf-feeding, cutting, wilting, or missing plants. Small cutworm larvae (less than 1/2 inch) feed on the leaves and do not begin cutting plants until they are about half grown.

A control measure is needed on corn in the 2-leaf stage if 3 percent or more of the plants are cut and if there are 2 or more cutworms per 100 plants. At the 4-leaf stage, control is justified if 3 percent or more of the plants are cut and if there are 4 or more worms per 100 plants. A single cutworm will cut fewer of the 4-leaf plants than those in the 2-leaf stage.

Preplant and planting-time treatments of chlorpyrifos (Lorsban) are registered for the control of black cutworms. Some growers may want to use chlorpyrifos in their high-risk fields. The label for chlorpyrifos (Lorsban 15G) indicates that it "will control moderate to low infestations of cutworms." Research indicates that a planting-time treatment of chlorpyrifos (Lorsban 15G) is relatively effective in controlling light to moderate infestations of cutworms, but control may be unsatisfactory with heavy infestations. Although ethoprop (Mocap) is also registered for control of cutworms, chlorpyrifos (Lorsban) has given better cutworm control in research trials.

A *preplant* broadcast treatment of chlorpyrifos (Lorsban 4E) is registered for cutworm control at 2 to 4 pints per acre. The insecticide should be incorporated into the top 2 to 4 inches of soil immediately after application. Research data are limited on the effectiveness of this treatment. The higher rate of 4 pints per acre is suggested.

EUROPEAN CORN BORERS

Overwintering larval populations in the fall of 1979 were substantially below those in the fall of 1978. Although the potential for first-generation infestations in 1980 appears to be lower, the most important factor relative to damage will be the weather conditions in June, when the corn borer moths are emerging and laying eggs.

Corn borer moths begin to emerge in late May in southern Illinois and mid- to late June in the central and northern regions. The females lay most of their eggs in the evening. They spend the daylight hours in fence rows and other protected areas.

The eggs, which are laid in masses, are usually deposited near the midrib on the underside of the lower corn leaves. Calm nights favor egg deposition by the moths. The absence of hard, beating rains during moth emergence also increases the potential for infestations.

Corn that is planted early (the fields with the tallest corn) should be monitored closely for signs of whorl-

feeding by corn borer larvae from mid-June to early July. The fields with the tallest corn are the most attractive for egg laying by first-brood moths. Control is warranted if 50 percent or more of the plants have fresh whorl-feeding, if live borers are present, and if plants are 24 or more inches tall (with the leaves extended).

First-generation borers reduce yields by stalk-tunneling, which weakens the plant and destroys the tissue used to transport food within the plant.

Some hybrids have varying degrees of tolerance or resistance to leaf-feeding by first-generation borers. Consider this trait when selecting varieties for 1980.

Corn planted late is most attractive to moths laying eggs for the second generation. Fields should be monitored from mid-July to mid-August for egg masses or newly hatched larvae of the second brood. Yield losses from this brood are due to stalk breakage (physical damage) as well as to physiological damage.

PLANTER-BOX SEED TREATMENTS

A planter-box seed treatment with diazinon will protect germinating corn against attack by seed-corn beetles and maggots. Use a seed treatment in fields that do not receive a soil insecticide at planting time, or use it when carbofuran (Furadan) is applied at planting time. The diazinon planter-box seed treatment is not needed if terbufos (Counter), fonofos (Dyfonate), chlorpyrifos (Lorsban), ethoprop (Mocap), or phorate (Thimet) is applied at planting. NOTE: Excess dust from the seed treater may interfere with the electronic monitor in air planters.

Use a diazinon seed-protectant to prevent damage to germinating soybeans from seed-corn maggots. Follow the label directions for application. The potential for damage is greatest during cool, wet springs when germination is slow.

REDUCED TILLAGE AND NO TILL PEST PROBLEMS

Concern about insects should not keep you from adopting conservation tillage practices. Most corn soil-insect problems that might be present in no-till or conservation tillage programs can be controlled with a soil insecticide applied at planting. Outbreaks of aboveground foliage-feeding pests, with a few exceptions, can be controlled with properly timed sprays. Close monitoring of fields to detect insect outbreaks is very important.

Insect problems occur more frequently in no-till corn than in any other tillage program and are often more serious. No-till gives pests a stable environment for survival and development.

Soil insecticides may be needed on no-till corn following grass sod or in any rotation in which grasses and weeds are prevalent. Phorate (Thimet), fonofos (Dyfonate), terbufos (Counter), ethoprop (Mocap), and carbofuran (Furadan) will provide some control of wireworms and white grubs in no-till corn planted in grass sod.

FORAGE INSECTS

In 1980, we expect *alfalfa weevils* to cause moderate to severe damage to the first cutting of alfalfa in most areas of Illinois. Only light to moderate damage is expected in the east-central and northeastern sections. In southern Illinois, where much fall egg laying takes place, alfalfa-weevil larval damage occurs early in the spring. Damage to the first cutting in northern Illinois is more likely to occur if hay harvest is delayed, as in 1978 and 1979. Alfalfa-weevil larvae and adults also may cause damage to alfalfa stubble after the first hay crop is removed.

Growers should inspect alfalfa fields closely during April, May, and June. Follow the suggestions in Circular 1136, *Alfalfa Weevil Pest Management Program*, to determine the need and proper timing of a treatment.

A fungal disease organism, *Entomophthora phytionomi*, was found infecting alfalfa weevil larvae in Illinois for the first time in 1979. It occurred statewide, but its effect on the weevil population was not fully determined. In many fields, alfalfa-weevil numbers reached damaging levels before the disease killed the larvae. The fungus overwinters in Illinois as resting spores, so it should be present in alfalfa fields in 1980.

Alfalfa-weevil populations may be kept below economic levels in some fields if the fungus germinates and spreads early enough in the spring. Check for brownish larvae stuck to the top leaves of the alfalfa plants. If the disease

is prevalent and keeps up with the weevil population, control measures may not be necessary.

Potato leafhoppers may cause moderate to severe damage to the second and third cuttings of alfalfa in all areas of Illinois in 1980. Damage first appears as a yellow wedge-shaped area at the tip of the leaf and is more evident during dry weather. Population levels are difficult to predict, however, because the leafhoppers do not survive the winter in Illinois. They migrate from states to the south into Illinois during May and June.

Potato-leafhopper damage may begin on the new growth as soon as the first hay crop is removed. (Stunting and yellowing are a sign of leafhopper injury.) A swarm of leafhoppers at the time of the first cutting indicates that there may be problems in the new growth. If you use a sweep net to monitor fields, apply treatments when there are one or more leafhoppers per sweep.

PEST-MANAGEMENT SCOUTING PROGRAMS

In recent years, "pest-scouting" programs have been initiated by several pest-management consulting firms to serve growers. Scouts monitor fields for outbreaks of pests and keep a close watch on potential problems. Identifying and controlling pest outbreaks through scouting programs could save a farmer thousands of dollars. The scout's observations can also be used to determine the need for applying a rootworm soil insecticide the following year.

Table 3. FIELD CORN

Insect	Time of attack	Insecticide*	Pounds of active ingredient per acre	Placement	Timing of application (See Table 10)
Corn rootworm	June-August	terbufos (Counter)	1 ^b	7-inch band	Apply ahead of planter press wheel. See discussion on page 4. Basal treatments during cultivation with Furadan, Dyfonate, Thimet, Counter, or Mocap are effective in late May or early June.
		fonofos (Dyfonate)**	1 ^b		
		carbofuran (Furadan)**	1 ^b		
		chlorpyrifos (Lorsban)	1 ^b		
		ethoprop (Mocap)**	1 ^b		
		phorate (Thimet)	1 ^b		
Seed-corn beetle	At germination	diazinon	1½ oz. a.i. per bu.	On seed	Or apply a band treatment of Dyfonate or Thimet.
Seed-corn maggot	At germination	diazinon	1½ oz. a.i. per bu.	On seed	Or apply Counter in the furrow, or band treatments of Dyfonate.
Wireworm	May-June	terbufos (Counter)	1 ^b	Furrow, Band	If infestations are severe, control may not be satisfactory. Thimet is labeled for the reduction of wireworms.
		fonofos (Dyfonate)**	4	Broadcast	
		carbofuran (Furadan)	2 ^b	Furrow	
		ethoprop (Mocap)**	1 ^b	7-inch band	
		phorate (Thimet)	1 ^b	7-inch band	
Sod webworm	May-June	toxaphene	2 ^b	At base of plant	At time of initial attack.
Cutworms	May-June	chlorpyrifos (Lorsban granules)	1 ^b	7-inch band	Apply at planting. Controls moderate to low infestations. Preplant incorporated.
		chlorpyrifos (Lorsban spray)	2	Broadcast	
		chlorpyrifos (Lorsban spray)	1½	Broadcast	Apply as a postplant rescue treatment when damage appears.
		carbaryl (Sevin bait)	1-2	Broadcast	
		carbaryl (Sevin spray)	2 ^b	Plant base	
		trichlorfon (Dylox, Proxol spray)	1 ^b	Plant base	

See next page for footnotes.

Table 3. FIELD CORN (continued)

Insect	Time of attack	Insecticide*	Pounds of active ingredient per acre	Placement	Timing of application (See Table 10)
White grub	May-October	terbufos (Counter)	2 ^b	7-inch band	Counter is labeled for the reduction of white grubs. The insecticides suggested for wireworms will give partial control of white grubs and grape colaspis but are not registered for these pests.
Grape colaspis	May-June				
Garden symphylan	May-July	terbufos (Counter) fonofos (Dyfonate)**	1-2 ^b 2	Band Broadcast	Before planting, lightly incorporate.
Grasshopper	June-September	carbaryl (Sevin) diazinon dimethoate (Cygon)	1-1½ ½ ½	Over row as spray	As needed. For ensilage corn use Sevin or diazinon.
Flea beetle	May-June	carbaryl (Sevin, Savit) diazinon	1 ½	Over row as spray	When damage becomes apparent on small corn.
Armyworm	May-August	carbaryl (†Sevin) trichlorfon (Dylox, Proxol) methomyl (*Lannate spray ^c)	1½ 1 ½	Over row as spray	At first migration or when leaves below ear level are consumed and worms are eating leaves above ear level.
Fall armyworm	July-September	carbaryl (Sevin, Savit) sprays diazinon granules trichlorfon (Dylox spray) methomyl (*Lannate spray ^c)	1½ 1 1 ½	In whorls	Granules preferred when worms deep in whorl. If worms are small and out on leaves, sprays are effective.
Chinch bug	June-August	carbaryl (†Sevin)	2	Spray at base of plant	At start of migration from small grains.
Thrips	June	malathion	1	On foliage as spray	When severe wilting and discoloration are noticed.
Japanese beetle	July-August	carbaryl (Sevin, Savit)	1	Over plant	During the silking period to protect pollination.
Corn leaf aphid	July-August	malathion diazinon	1 1	Foliage spray	Apply during late whorl to early tassel when 50% of the plants have light to moderate infestations.
Corn rootworm adults	Late July, early August	carbaryl (Sevin, Savit) malathion diazinon phosmet (Imidan)	1 1 ½ ½	Overall spray or directed toward silk	Before 75% of plants have silked, if there are more than 5 beetles per ear and if silk clipping is observed. Only to protect pollination.
Corn borer, first generation	June-July	carbaryl (Sevin granules) diazinon granules carbofuran (Furadan granules) fonofos (Dyfonate granules)	1½ 1 1 1	On upper ⅓ of plant and into whorl	When 50% or more plants show fresh whorl feeding, live borers are present, and plants are over 24" tall.
Corn borer, second generation	Mid-August	carbaryl (Sevin granules) diazinon granules carbofuran (Furadan granules) fonofos (Dyfonate granules)	1½ 1 1 1	Over row	Apply at first hatch when there are 100 or more egg masses per 100 plants. Two treatments may be necessary because of the extended egg-laying period.
Southwestern corn borer	August	carbofuran (Furadan granules)	1	From ear upward	Direct granules into whorls. Apply when 25% of plants have egg masses or larvae on leaves. Early-planted corn usually escapes damage.

* Use restricted to certified applicators only. † State-labelled insecticide. Applicator must have Illinois label in possession when applying.

** Liquid formulations are restricted.

* See Table 10 for insecticide restrictions.

^b Based on 40-inch row spacing. Increase rates for narrow rows.

^c To be applied only by experienced operators or those wearing protective clothing.

Table 4. STORED GRAIN (Corn, Wheat, and Oats)^a

Insect	Time of attack	Insecticide and dilution	Dosage	Placement	Suggestions (See Table 10)
Angoumois grain moth (earcorn)	April-October (southern 1/3 of Illinois only)	malathion 57% E.C., 3 oz. per gal. water	Apply to runoff	Spray surface and sides May 1 and August 1	Plant tight husk varieties. Store as shelled corn to avoid all but surface damage by angoumois moth.
Meal moths and surface infestations only ^b	April-October	dichlorvos 20% (DDVP, Vapona) plastic resin strip ^c	1 per 1,000 cu. ft. space above grain mass	Attach to ceiling or side wall	Clean and spray bin with 1.5% malathion to runoff before storage. Store only clean dry grain. Install May 15 or at storage or for emergency control. Replace every 6 weeks between May and October.
General					
Internal and external feeders	April-October	malathion 57% E.C., 1 pt. per 3-5 gal. water ^d	3-5 gal. per 1,000 bu.	Spray uniformly as grain is binned	Clean and spray bin with 1.5% malathion to runoff before storage. Store only clean dry grain. Protect surface with dichlorvos resin strips as recommended for meal moths.
Rice and granary weevils					
Flat grain beetle		liquid fumigant ^{e, f}	3-5 gal. per 1,000 bu.	On surface; repeat if necessary	Clean and spray bin with 1.5% malathion to runoff before storage. Store only clean dry grain. Apply in late July and September in the southern half of Illinois; apply in mid-August in the northern half of Illinois. Protect surface with dichlorvos resin strips as recommended for meal moths.
Saw-toothed grain beetle					
Rusty grain beetle					
Foreign grain beetle		*methyl bromide + *ethylene dibromide ^{f, g}	As directed	On surface	
Cadelle beetle					
Flour beetle		*aluminum phosphide ^b	180 tablets or 300 pellets per 1,000 bu.	Uniformly throughout	Fumigants are best used for emergency control of existing infestations.

* Use restricted to certified applicators only.

^a Corn need not be treated if harvested after October 1 unless it is to be carried over the following summer. Wheat and oats should be treated if they are to be held for one month or more in storage after harvest. Soybeans stored at safe moisture levels are attracted only by Indian meal moth.

^b Remove webbing before treatment.

^c Effective only in enclosed bins. Kills adult moths but not the eggs or larvae. Several weeks required to control effectively an existing infestation. Fumigate the grain if immediate control is desired. Also cleared for use in bins of stored soybeans.

^d Use only the grade of malathion labeled for use on stored grain. Apply after drying because malathion vaporizes and is lost rapidly when grain is heat-dried.

^e Some common liquid fumigants are: *carbon bisulfide + *carbon tetrachloride, *ethylene dichloride + *carbon tetrachloride, *ethylene dichloride + *ethylene dibromide + *carbon tetrachloride, etc.

^f Use with extreme caution. Apply only under calm conditions and when grain temperature is 70° F. or above. Grain should be 8 inches below the lip of the bin and should be leveled before fumigating. Cover the surface with a plastic tarp for 24 hours, then air out.

^g Called the 73 mixture.

^b Called *Phostoxin or Detia. Slow vaporization with a 3-day exposure period. Can be used at grain temperature of 60° F. or above. Grain should be 8 inches below the lip of the bin and should be leveled before fumigating. Cover the surface with a plastic tarp for 3 days, then air out.

Table 5. SMALL GRAINS (Barley, Oats, Rye, Wheat)

Insect	Time of attack	Insecticide ^a	Pounds of active ingredient per acre	Placement	Timing of application (See Table 10)
Armyworm	May-June	toxaphene ^b trichlorfon (Dylox)	1½ ¾	On foliage	When there are 6 or more armyworms per linear foot of row and before extensive head-cutting occurs. Do not use Dylox on rye.
Greenbug	May-June	Cygon	¼	On foliage	When needed. Penncap-M is cleared for greenbug only. Use Cygon and Penncap-M on wheat only.
English grain aphid		methyl parathion (Penncap-M)*	¼		
		malathion	1		

* Use restricted to certified applicators only.

^a See Table 10 for insecticide restrictions.

^b For use on dairy farms only when alternate material is not available and when insect emergency exists. Do not apply as foliage sprays or dusts to or adjacent to dairy pasture, hay, or forage crops.

Table 6. ALFALFA AND CLOVER

Insect	Time of attack	Insecticide ^{a, b}	Pounds of active ingredient per acre	Placement	Timing of application ^b (See Table 10)
Alfalfa weevil (Spring treatment)	March-June	carbofuran (Furadan ^{c, d})*	¼	On foliage	Refer to Circular 1136. Or, when 25% of the tips are being skeletonized and there are 3 or more larvae per stem, treat immediately; two treatments may be necessary on first cutting; regrowth following first cutting may need protection. By ground, use a minimum of 20 gal. of finished spray per acre (10 gal. on stubble) or 4 gal. by air. Do not apply during bloom. Instead, cut and remove the hay.
		azinphosmethyl (Guthion ^c)*	½		
		methyl parathion ^{c*}	½		
		methidathion (Supracide ^c)	½		
		malathion plus methoxychlor	1		
		diazinon plus methoxychlor (Alfatox)	½		
Clover leaf weevil	March-April	phosmet (Imidan)	1	On foliage	Do not spray alfalfa with Pennncap-M during bloom to avoid injury to bees.
		methyl parathion* (Pennncap-M)*	½		
		malathion	1		
		azinphosmethyl (Guthion ^c)*	½		
		malathion	1		
		dimethoate (Cygon, De-Fend)	½		
Aphid	April-May	diazinon	½	On foliage	When aphids are becoming abundant and lady beetle larvae and adults, parasites, and disease are slight.
		malathion	1		
		malathion	1		
Leafhopper	June-August	carbaryl (Sevin, Savit)	1	On foliage	When second-growth alfalfa is 4 to 6 inches high, or as needed. If using a sweep net to monitor, apply treatment when there are one or more leafhoppers per sweep.
		diazinon	½		
		dimethoate (Cygon, De-Fend)	½		
		trichlorfon (Dylox)	¾		
		methidathion (Supracide ^c)	½		
Webworm	July-August	carbaryl (Sevin, Savit)	1	On foliage	When damage appears.
		trichlorfon (Dylox)	1		
Variegated cutworm	April-June	carbaryl (Sevin bait)	1½	On foliage	Cut, remove hay, and spray immediately.
		trichlorfon (Dylox)	1		
		methomyl (Lannate)*	½		
Armyworm	May-June, September	carbaryl (Sevin)	1½	On foliage	Only when grasses are abundant.
		trichlorfon (Dylox)	1		
Grasshopper	June-September	dimethoate (Cygon, De-Fend)	½	On foliage	When grasshoppers are small and before damage is severe. When plants are blooming, do not apply Sevin or Cygon. Apply others only late in day.
		carbaryl (Sevin, Savit)	1		
		diazinon	½		
		carbofuran (Furadan ^{c, d})*	¼		

* Use restricted to certified applicators only.

^a See Table 10 for insecticide restrictions.

^b Before applying insecticides, be certain to clean all herbicides out of equipment. During pollination, apply very late in day or, if possible, avoid application during bloom.

^c To be applied only by experienced operators or those wearing protective clothing.

^d Only for pure stands of alfalfa. When using no more than ¼ pound per acre, allow 7 days between application and harvest. If you use ½ to 1 pound per acre, allow 14 days to elapse between application and harvest.

* This product is highly toxic to bees exposed to direct treatment or residues on crops.

Table 7. NONCROP AREAS

Insect	Time of attack	Insecticide ^a	Pounds of active ingredient per acre	Placement	Timing of application (See Table 10)
Grasshoppers	June-July	carbaryl (Sevin 4-Oil)	1	On foliage	When nymphs are abundant and before migration into row crops. Treat while hoppers are small.
		carbaryl (Sevin)	1		
		dimethoate (†Cygon)	½		
		diazinon	½		

^a See Table 10 for insecticide restrictions. † State-labelled insecticide. Applicator must have Illinois label in possession when applying.

Table 8. GRAIN SORGHUM

Insect	Time of attack	Insecticide ^a	Pounds of active ingredient per acre	Placement	Timing of application (See Table 10)
Webworm	After heads form	carbaryl (Sevin, Savit)	1½	On grain head	When 10 to 25 percent of the heads are infested with 5 or more larvae per head. Pest usually bad in wet seasons on late-planted grain.
Corn earworm	After heads form	carbaryl (Sevin, Savit)	1½	Direct at head or broadcast	When there is an average of 2 worms per head.
Midge	August-September	dimethoate (Cygon)	¼	Direct at head	When 50% of heads have begun to bloom and there are 1 or more midge adults per head.
		diazinon	¼		
		carbaryl (Sevin)	1½		
Corn leaf aphids	All season	dimethoate (Cygon) malathion	¼ 1	Broadcast	Under drouth conditions when populations are heavy and damage is apparent.
Greenbug	June-July	dimethoate (Cygon, De-Fend) malathion	¼ 1	Broadcast	When greenbug damage is sufficient to cause death of more than 2 normal-sized leaves before the hard-dough stage.
Fall armyworm	July-August	carbaryl (Sevin)	1½	Over row	When there is an average of 2 worms per head. Whorl feeding is seldom economic.

^a See Table 10 for insecticide restrictions.

Table 9. SOYBEANS

Insect	Time of attack	Insecticide ^a	Pounds of active ingredient per acre	Placement	Timing of application (See Table 10)
Seedcorn maggot	Germination	diazinon	¾ oz. a.i. per bu.	On seed	At planting time.
Bean leaf beetle	May-June, August	carbaryl ^b (Sevin, Savit) acephate (Orthene)	1 ½	On foliage	When leaf feeding exceeds 35% prebloom and 15% between blooming and pod fill.
Grasshopper	June-September	dimethoate (Cygon) carbaryl ^b (Sevin, Savit) carbaryl (†Sevin 4-Oil)	½ 1 1	On foliage	When migration from adjacent crops begins.
Green clover worm	August	carbaryl ^b (Sevin) methomyl (Lannate ^c)* <i>Bacillus thuringiensis</i> (Dipel, Thuricide) carbaryl (†Sevin 4-Oil)	1 ¼ (See label) 1	On foliage	When damage occurs between blooming and pod fill. Usually requires 12 or more half-grown worms per foot of row and 15% defoliation to justify treatment.
Webworm	June-August	carbaryl ^b (Sevin, Savit)	1		Usually requires 15% or more defoliation between blooming and pod-fill to justify treatment.
Mites	June-August	carbophenothion (Trithion ^c) dimethoate (Cygon)	¾ ½	On foliage	As needed on field margins and entire field.
Stink bugs	July and August	acephate (Orthene)	¾	On foliage	As needed when bugs are numerous; 1 per yard of row may cause damage.
Thrips	June-August	carbaryl ^b (Sevin, Savit)	1	On foliage	As needed.

* Use restricted to certified applicators only. † State-labelled insecticide. Applicator must have Illinois label in possession when applying.

^a See Table 10 for insecticide restrictions on soybeans.

^b Sevin should not be used at more than 1 lb. per acre. Higher rates may damage plants.

^c To be applied only by experienced operators or those wearing protective clothing.

Table 10. LIMITATIONS IN DAYS BETWEEN APPLICATION OF THE INSECTICIDE AND HARVEST OF THE CROP AND OTHER RESTRICTIONS ON THE USE OF INSECTICIDES FOR FIELD CROP INSECT CONTROL

(Blanks in the table denote that the material is not suggested for that specific use in Illinois)

	Worker re-entry times ^a (hours)	Field corn			Sorghum	Forage crops		
		Seed and soil	Grain	Ensilage and stover		Alfalfa	Clover	Pasture
Counter (terbufos)	...	A	...	...	...	...	...	...
De-Fend, Cygon (dimethoate)	14	14	28	10,B	...	...
diazinon	...	A	...	0	7	7	7	0
**Dyfonate (fonofos) ^b	...	A	45	45	...	...	...	...
Dylox, Proxol (trichlorfon)	C	C	...	0	0	0
**Furadan (carbofuran) ^b	...	A	...	D	...	7,E	...	...
*Guthion (azinthosmethyl) ^{a,b}	24	...	...	...	...	16,B	16,B	...
Imidan (phosmet)	14	14	...	7,B	...	...
*Lannate (methomyl) ^{a,b}	0	3	...	7	...	...
Lorsban (chlorpyrifos)	...	A	50	50	...	...	...	...
malathion	5	5	7	0	0	0
methoxychlor	7	7	...
*methyl parathion ^{a,b}	48	...	...	...	...	15	15	...
**Mocap (ethoprop) ^b	...	A	...	...	...	...	...	...
*Pennac-M ^{a,b,c}	15	...	...
Sevin, Savit (carbaryl)	0,K	0,K	21	0	0	0
Supracide ^b (methidathion)	10,G	...	...
Thimet (phorate)	...	A	30,H	30,H	...	...	...	...
toxaphene	28,A	I	...	...	...	...
		Barley	Oats	Rye	Wheat	Soybeans		
Cygon (dimethoate)	60	21		
Thuricide, Dipel (<i>Bacillus thuringiensis</i>)	0		
Dylox (trichlorfon)	...	21	21	...	21	...		
*Guthion (azinthosmethyl) ^{a,b}	24	...	...	...	...	45,F		
*Lannate (methomyl) ^{a,b}	14		
malathion	7	...		
*Pennac-M ^{a,b,c}	15	...		
Sevin (carbaryl)	0		
toxaphene	...	J	J	J	J	...		
Trithion (carbophenothion) ^{a,b}	48	...	...	...	...	7,F		
Orthene (acephate)	14,F		

* Use restricted to certified applicators only. ** Liquid formulations are restricted.

^a Workers should be warned in advance of treatments. Workers may not enter fields treated with the insecticides without wearing protective clothing for the intervals indicated. They may not enter a field treated with other insecticides until the spray has dried or the dust has settled without wearing protective clothing. Protective clothing includes a hat, long-sleeved shirt, long-legged pants, and shoes and socks.

^b Sprays to be applied only by experienced operators wearing proper protective clothing.

^c Microencapsulated.

A. No specific restriction when used as recommended.

B. Apply only once per cutting, and do not apply during bloom.

C. Three applications may be made per season. Can be applied up to harvest.

D. Do not make a foliar application if Furadan 10 granules were applied at more than 10 pounds per acre at planting. Do not make more than two foliar applications per season.

E. Make no more than one application per season.

F. Do not graze or feed treated vines to livestock.

G. Make no more than one foliage and one stubble application per cutting.

H. Besides treatment at planting, one more application can be made at cultivation or over the corn later in the season.

I. Do not feed treated forage to dairy animals. Do not feed sprayed forage or granular-treated corn silage to livestock fattening for slaughter. Do not graze meat animals on granular-treated stover within 28 days of slaughter.

J. Do not graze or feed treated forage to dairy animals or to animals being finished for slaughter.

K. Do not apply granules within 7 days of harvest.

**ALWAYS CONSULT PESTICIDE LABEL
FOR MORE INFORMATION**

PESTICIDE SAFETY

Certain precautionary steps should be taken when handling insecticides. Some of the insecticides suggested in this publication can be poisonous to the applicator. The farmer is expected to protect himself, his workers, and his family from needless exposure.

When using insecticides, apply all the scientific knowledge available to make sure that there will be no illegal residue on the marketed crop. Such knowledge is condensed on the label. **READ THE LABEL CAREFULLY AND FOLLOW THE INSTRUCTIONS.** The label should be recent and not from a container several years old. Do not exceed the maximum rates suggested. Observe the interval between application and harvest. Apply only to crops for which use has been approved. Make a record of the product used, the trade name, the percentage content of the insecticide, the dilution, the rate of application per acre, and the date or dates of application.

Always handle insecticides with respect. The persons most likely to suffer ill effects from insecticides are the applicator and his family. Accidents and careless, needless overexposure can be avoided. Following these rules will prevent most insecticide accidents:

1. Wear rubber gloves when handling insecticide concentrates.
2. Do not smoke while handling or using insecticides.
3. Keep your face turned to one side when opening, pouring from, or emptying insecticide containers.
4. Leave unused insecticides in their original containers with the labels on them.
5. Store insecticides out of the reach of children, irresponsible persons, or animals; store preferably in a locked building. Do not store near livestock feeds. Better yet, buy no more pesticide than you will use, thus eliminating a pesticide storage and disposal problem.
6. Triple rinse, bury, or burn all empty insecticide containers or take them to an appropriate sanitary landfill.
7. Do not put the water-supply hose directly into the spray tank or blow out clogged nozzles or spray lines with your mouth.
8. Wash with soap and water exposed parts of the body and clothes contaminated with insecticides.

9. Do not apply to fish-bearing or other waters.

10. Do not leave puddles of spray on impervious surfaces or apply insecticides near dug wells or cisterns.

11. Do not apply insecticides, except in an emergency, to areas with abundant wildlife.

12. Do not spray or dust when weather favors drift.

13. To avoid bee kill, apply insecticides after bee activity has been completed for the day; use the least toxic materials. *Warn beekeepers that you are applying insecticides.*

POLICY STATEMENT

The *Illinois Insect Pest Management Guide: Field and Forage Crops* (Circular 899) is revised annually and is intended for use during the current calendar year only. Not all registered insecticides are included in this circular. Insecticides that are effective and do not present an undue hazard to the user are suggested whenever possible.

Trade names have been used for simplicity, but their usage does not imply endorsement of one product over another, nor is discrimination intended against any product.

This guide for insect control is based on research results from the Illinois Natural History Survey, the University of Illinois Agricultural Experiment Station, other experiment stations, and the U.S. Department of Agriculture.

Requested label clearances for a few uses of some insecticides, carriers, and solvents are uncertain for 1980 because many requests have not yet been officially cleared. Be sure to check with your county Extension adviser in agriculture if you are in doubt about an insecticide you plan to use. We will make announcements of label changes through the news media to keep you up to date.

REFERENCES

This circular lists only suggested uses of insecticides for the control of many pests in Illinois field crops and is not designed to discuss other methods of control. Fact sheets discussing nonchemical control methods, descriptions of specific insects, and their life history and biology (designated by NHE numbers) can be obtained from the office of the county Extension adviser in agriculture or by writing to Entomology Extension, 172 Natural Resources Building, Urbana, IL 61801.

The suggestions given in this circular are revised annually by entomologists of the College of Agriculture and the Illinois Natural History Survey.

UNIVERSITY OF ILLINOIS-URBANA
Q.630.71L6C C005
CIRCULAR URBANA, ILL.
899 REV. 1980



3 0112 019541157